Caller's Ability to Understand "Responding Normally" vs. "Completely Alert" Key Question in a Brazilian Portuguese Version of an Emergency Medical Dispatch Protocol

Valéria de Cássia Pereira, RN, EMD-QI [1]; Sara Scott[2]; Maristela Uta Nakano, MD, MBA[4]; Greg Scott, MBA, EMD-QI[3]; Christopher Olola, PhD[3]; Isabel Gardett, PhD[3]; Srilakshmi Sangaraju, MS[3]; Irena Weight[2]; Daniel Ashwood, PhD[3]; Edward Trefts, MFA[3]; Brett Patterson[3]; Jeff Clawson, MD[3]

1. Serviço de Atendimento Móvel de Urgência (SAMU 192), São Paulo, Brazil.
2. Priority Dispatch Corp., Salt Lake City, Utah, USA.
3. International Academies of Emergency Dispatch, Salt Lake City, Utah, USA.
4. Emergency Services Regulation Center, Municipality of São Paulo, São Paulo, Brazil.

Corresponding Author
Greg Scott
International Academies of Emergency Dispatch
110 S. Regent Street, Salt Lake City, Utah 84111
greg.scott@emergencydispatch.org

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ABSTRACT

Introduction: Alertness is important to assess during many medical emergencies; however, assessing alertness is difficult in a non-visual emergency dispatch environment. Little is understood about how to best gather an accurate report of patient alertness during an interaction between callers and Emergency Medical Dispatchers (EMDs).
Objectives: The primary objective of the study was to compare two versions of a Key Question (KQ) intended to gain an accurate report of alertness, to determine whether either demonstrates a higher degree of caller understanding and definitive response.
Methods: This was a descriptive quantitative study using retrospective and prospective data collected from Serviço de Atendimento Móvel de Urgência (SAMU), an emergency dispatch center in Sao Paolo, Brazil. A study version of the MPDS protocol was implemented that changed the original KQ ("Is s/he completely alert (responding appropriately)?" [Portuguese translation "Ele/a está completamente alerta (respondendo apropriadamente)?"] (pre-test) to "Is s/he responding normally (completely alert)?" [Portuguese translation "Ele/a está respondendo normalmente (completamente alerta)?]") (post-test). Various outcomes related to caller understanding and definitive responses were measured.
Results: The pre-test and post-test groups varied greatly with respect to providing uncertain/"didn't understand" KQ responses (62.7% and 0.99% respectively). KQ clarification varied significantly by study group, with almost half of the pre-test group (47.9%) using a clarifier compared with 7.8% of the post-test group. 22.4% of cases in the pre-test group made two or more attempts to clarify the KQ, compared with none in the post-test group.
Conclusions: Callers in this study demonstrated a significantly higher degree of understanding when asked, "Is s/he responding normally," compared with the existing KQ, "Is s/he completely alert?" The findings suggest that callers understand the new phrasing better and are therefore more likely to provide accurate patient status responses.

INTRODUCTION

Alertness, a category of mental status, is clinically very important to assess because decreased alertness can reflect an "underlying emergent condition."[1] In clinical settings, however, there is a lack of consensus about how to properly define or communicate mental status. For instance, one author bemoans the vagueness of mental status terms such as orientation or confusion,[2] while another asserts that the majority of these terms "can mean different things to different people."[3] As a result, many sources propose the use of tests or tools, such as the Glasgow Coma Scale or the Mini-Cog, as a means to improve the assessment confidence of clinicians.[3-4]

The difficulty of evaluating mental status, particularly alertness, only becomes more pronounced in the dispatch context, where the Emergency Medical Dispatcher (EMD) must work through the eyes and ears of the caller, who is most likely a layperson. While medical professionals may be able to distinguish between a clinically urgent sense of alertness, relating to the patient's capacity to interact with their environment,[1] and other possible senses such as wakefulness,[5-6] the layperson caller is likely to be unclear about

which sense of alertness is the right one, or what the word "alert" means at all. Additionally, even if the caller does know what the word "alertness" means, there is the challenge of assessing the patient's alertness level during a critical interaction. Certainly, one cannot presume the caller will have any familiarity with tools used to measure alertness in the clinical setting.[4]

These issues make "determining true non-alertness" a "Holy Grail" of Emergency Medical Dispatching.[7] Even though it is known that determining a patient's alertness level is of great importance (it is considered a "priority sign/symptom"), unfortunately little is understood about how to best gather an accurate description of alertness during an interaction between caller and emergency dispatcher. Therefore, it is important to evaluate the effectiveness of dispatcher communications intended to accurately capture alertness, where "effectiveness" means that the communication is generally understood by callers and produces an accurate report of the patient's condition, which is then accurately interpreted for input. Additionally, it will be crucial to explain more broadly why some dispatcher communications are more effective than others.

The Medical Priority Dispatch System (MPDS®) (Priority Dispatch Corp., Salt Lake City, Utah, USA) is a standardized tool used by EMDs to gather information, provide instructions, and send the appropriate response to an emergency scene. In the MPDS, the importance of assessing alertness is indicated by the high frequency of the Key Question (KQ), "Is s/he completely alert?" which appears on 28 of the total 38 Chief Complaint Protocols. However, there is some indication that the question "Is s/he completely alert (responding appropriately)?" is not always understood by callers. Anecdotally, MPDS-user agencies in the USA, Canada, UK, and Brazil report that the emergency caller has difficulty understanding this alertness question, as evidenced though ambiguous answers such as "I think so," "Sort of," and "He's alert but a little disoriented/confused." Callers have also been known to signal that they don't understand the meaning of the term itself (e.g., "What do you mean by completely alert?"). These answers result in the EMD attempting a clarification to the question, typically by using the scripted parenthetical clarifier required by the protocol, ("Is s/he responding appropriately?"), with some EMDs reporting that this clarifier may be better understood than the original phrasing of the question.

To better understand the effectiveness of the scripted questions, this study compared instances in which EMDs in a Brazilian emergency dispatch center asked the MPDS question "Is s/he completely alert (responding appropriately)?" [Portuguese translation "Ele/a está completamente alerta (respondendo apropriadamente)?"] with instances in which this question was replaced by the related phrasing, "Is s/he responding normally (completely alert)?" [Portuguese translation "Ele/a está respondendo normalmente (completamente alerta)?].

OBJECTIVES

The primary purpose of this study was to quantify the caller's ability to answer definitively "yes" or "no" to the KQ "Is s/he completely alert (responding appropriately)?" on the first attempt, as compared to the caller's ability to answer definitively "yes" or "no" to the alternative KQ "Is s/he responding normally (completely alert)?" on the first attempt. Another objective was to compare the two KQs to determine whether either demonstrated a higher degree of caller understanding and definitive response.

METHODS

Design and Setting

This was a descriptive quantitative study using retrospective and prospective data. The study was conducted in Serviço de Atendimento Móvel de Urgência (SAMU 192), an emergency medical dispatch center in Sao Paolo, Brazil. SAMU 192 is an International Academies of Emergency Dispatch (IAED) Accredited Center of Excellence (ACE) (since 2012), demonstrating high compliance to the MPDS protocol, including the Key Question containing the phrase studied here. SAMU 192 is a federally and municipally run emergency medical system that serves a population of over 12 million permanent residents within the city boundaries, and a daytime population estimated at over 15 million. The dispatch center employs 186 IAED-certified EMDs who handle over 30,000 MPDS cases per month (approximately 400,000 per year). The dispatch center uses a tiered response scheme in which the MPDS determinant code is used to assign the type of response.

Study Procedures

For the retrospective phase (pre-test study group), a certified EMD-Q (medical quality assurance expert) selected a random sample of 207 audio calls handled using any MPDS Protocol on which the EMD asked the KQ, "Is s/he completely alert (responding appropriately)?" For the prospective phase (post-test study group), a study version of the MPDS protocol was implemented for ProQA® Paramount™ (software version of the MPDS v13.1). This study version changed the original KQ to, "Is s/he responding normally (completely alert)?" In both cases, the text in parentheses was a KQ clarifier, intended to be used if the caller did not understand the initial phrasing. SAMU loaded this software update for the prospective stage of the study. Subsequently, a random sample of 208 audio cases in which EMDs asked the new version of the question was selected for audit. For both phases of the study, the audio calls were reviewed, and the caller's initial answers/responses were recorded on a data collection form, along with any attempts by the EMD to clarify the question and the caller's answer to each attempt.

Outcome Measures

The primary outcome measures were (1) the number of times the KQ was asked correctly; (2) the number of times the caller provided a definitive "yes" or "no" answer to the KQ on the first attempt; (3) the number of times the EMD provided a clarifier; and (4) the number of attempts made by the EMD in providing a clarifier. The secondary outcome was the distribution of Chief Complaint Protocols during the pre- and post-test periods.

Data Analysis

R statistical software (R, version 3.5.2) was used for data analysis. Descriptive statistics such as percentages characterized measures of caller understanding (e.g., times caller gave a certain answer, times EMD provided a KQ clarifier). To assess associations between categorical measures (e.g., gender, type of caller) in the pre-test and post-test groups, the study used two-sided Fisher's exact test and the Chi-Square test (where appropriate). For the continuous variable of age, the Shapiro-Wilk test was used to assess normality. Given the distribution could not be assumed to be normal, the nonparametric Mann-Whitney-Wilcoxon U test was used to determine independent associations. For all statistical tests, the significance of association was examined at the 0.05 level.

RESULTS

A total of 415 audio files were obtained (207 for the pre-test group and 208 for the post-test group). Of these files, five were excluded because the call stopped prematurely (due to cancellation by the caller or EMD) or the call was a callback about ambulance status on an already-processed event. Additionally, non-compliant cases, in which the EMD asked a freelance question (i.e., a question that was not a pre-test or post-test version of the KQ), were removed from final analysis for both the pre-test (n=5, 2.4%) and post-test groups (n=6, 2.9%). Therefore, 399 calls were included in the analysis—196 calls in the pre-test group and 203 in the post-test group (Table 1). The median age was 50 years (51 years in pre-test and 50 years in post-test group, $p = 0.824$). Gender was equally represented in both pre-test (female 46%, male 54%) and post-test (female 48%, male 52%) study groups, p=0.125. Most calls were made by 2nd-party callers in both pre-test (82.7%) and post-test groups (85.5%). The remaining calls in the pre-test and post-test study groups (17.2% and 14.5% respectively) were by 3rd-party callers.

EMDs asked the KQ correctly in similar proportions for pre-test (97.5%) and post-test groups (97.1%). The study groups, in contrast, varied greatly in proportion with respect to providing uncertain or "didn't understand" KQ responses (62.7% and 0.99% respectively, $p < 0.001$). As well, the proportion of callers providing a clear "yes" answer to the KQ varied significantly between the pre-test and post-test study groups (28.1% and 86.2% respectively, $p < 0.001$). However, with respect to the ratio of clear "yes" to clear "no" answers, the study groups did not differ significantly (p=.893).

EMDs asking the KQ only once varied from 89.8% in the pre-test group to 99.0% in the post-test group ($p < 0.001$). After EMDs asked the KQ, clarifier use varied by study group in a statistically significant nonrandom manner ($p < 0.001$). In almost half of the pre-test group cases (47.9%), the EMD used a KQ clarifier, compared with 7.8% of the post-test group cases. Specifically, in 22.4% of cases, an EMD made two or more attempts to clarify the KQ in the pre-test group, compared to none in the post-test group ($p < 0.001$).

Between the pre-test and post-test groups, no inter-group associations were tested for Chief Complaint (CC) by clarifier, due to incomplete CC data. In cases for which a CC was identified by the reviewer, no significant associations were observed between CC selection and clarifier use ($p = 0.2164$). Similarly, no significant associations were observed between selection of CC and number of attempts to clarify the KQ ($p = 0.1936$).

Further analysis indicated no statistically significant differences in patient gender distributions in association with (1) answer to the KQ ($p = 0.8308$); (2) number of times the KQ was asked ($p = 0.7617$); (3) use of the clarifier ($p = 0.2805$); or (4) number

Measure		Pre-test Group (Completely Alert) (N = 196) n (%)	Post-test Group (Responding Normally) (N = 203) n (%)
Key Question			
	Caller's Answer*		
	Yes	55 (28.1)	175 (86.2)
	No	8 (4.1)	24 (11.8)
	Uncertain/Didn't Understand	123 (62.7)	2 (0.99)
	Unknown	10 (5.1)	2 (0.99)
	Number of Attempts*		
	1	176 (89.8)	201 (99.0)
	2	19 (9.7)	2 (0.98)
	>2	1 (0.5)	0 (0.0)
Clarifier			
	Used by the EMD*		
	Yes	94 (47.9)	16 (7.8)
	No	102 (52.1)	187 (92.1)
	Number of times clarifier used*		
	0	102 (52.1)	187 (92.1)
	1	50 (25.5)	16 (7.8)
	2	40 (20.4)	0 (0.0)
	>2	4 (2.0)	0 (0.0)

EMD, Emergency Medical Dispatcher
* indicates statistically significant difference at $p = 0.05$ level.

Table 1. Categorical comparison of callers' understanding of the Key Questions when asked correctly, and clarifier use by dispatchers

of attempts the dispatcher made to clarify the KQ ($p = 0.4775$). Age of the patient also did not differ in a statistically significant manner by any of the variables studied.

DISCUSSION

Callers in this study demonstrated a significantly higher degree of understanding when asked, "Is s/he responding normally (completely alert)," compared with the existing KQ, "Is s/he completely alert (responding appropriately)?" In response to "Is s/he completely alert," callers were more than 60 times as likely to answer with uncertainty or to not understand the question, and the EMD provided a clarifier to the question more than 6 times as often when asking the question as originally phrased than when using the revised phrasing. Moreover, EMDs were far more likely to provide multiple clarifiers (to clarify the question more than once) when using the original phrasing. Interestingly, callers who provided "certain" answers in response to the test phrase (a clear "yes" or "no") showed a nearly equal ratio of "yes" versus "no" answers compared to those responding to the original phrase—even though the absolute number of certain responses was much higher. The revised phrasing thus appears to increase understanding of the question without changing the relative number of patients reported to be "alert" or not. As a result, although the rephrasing reduces time and confusion, it may not affect overall accuracy or over-triage. This finding should be explored in future studies using on-scene or hospital reports of clinically-assessed alertness in order to obtain a more complete understanding related to patient outcomes.

Even though the study found that callers displayed a stronger understanding of "Is s/he responding normally (completely alert)?" compared to "Is s/he completely alert (responding appropriately)?" it is unclear which linguistic characteristics made the revised phrasing more effective. One possible explanation is that the change in phrasing provides information to the caller that is more useful or instructive with respect to answering the question. Useful information, in this context, means information that the caller can use to perform assessments of patient alertness. After all, the caller may *know what* the phrase "completely alert" means (what it refers to), but they may not *know how* to assess alertness. Under this explanation, the original phrasing of the question does not provide enough useful information because it indicates *what* the caller should be looking for but not *how* to complete the assessment. The rephrased version, however, provides information that the caller can use to determine patient alertness, providing an implied instruction to compare the patient's current state to their normal state. Such a comparison draws directly on knowledge familiar to the caller and provides them with a directive about how to evaluate the patient's condition. In contrast, the original phrasing simply presents a concept ("alertness"), which the caller must then figure out how to assess or evaluate on their own. Instructed assessments are routine in EMD practice and in telehealth more generally, where various tests for laypeople to perform are delivered over the phone to help "manage the absence of visibility."[8] Like assessment tools used regularly by EMDs, the new phrasing of the question might provide the right information for the caller to know both what to evaluate and how to do so.

Another element of the changed phrasing that may explain its increased effectiveness is the "manner" in which it is phrased—the revised language, in other words, may be clearer to the caller. The revised phrase ("Is s/he responding normally?") is a plain-language expression using words that appear frequently during regular speech, while the original phrase (Is s/he completely alert?") can be seen as medical jargon, which is "any word or phrase that is opaque to individuals lacking medical training and/or exposure."[9] Also, the lack of clarity in this phrase is amplified by the fact that even within the research community there are multiple meanings of the word "alert." Some studies characterize alertness as a feeling that is opposed to sleepiness or tiredness,[5-6] while others relate alertness more closely with anxiety[10] or even with being aware of the "big picture" of a situation.[11] In addition to being medical jargon and having multiple meanings, "alert" is simply a less common word than "respond." A test using Google Book N-gram viewer, a popular measure of word familiarity, indicates that "respond" has appeared in English-language texts about three times as frequently as "alert" as of 2008.

Overall, the study results challenge the notion that "anything goes" when it comes to EMD-caller interactions. Even what appear to be small changes in wording can make substantial differences in caller understanding and, by extension, resource allocation and patient outcomes. At least for the alertness question, how the EMD phrases a question (and how it is scripted in the protocol) can dramatically impact whether callers offer definitive answers, how much time is taken in determining patient status, and whether the patient's true state is determined and communicated. Future studies will go further, evaluating the effectiveness of the "alert" question against the "responding normally" clarifier in other languages, as well as evaluating other existing questions that have caused similar anecdotal reports of caller misunderstanding. Some of these misunderstandings may originate from certain languages not attaching clinical meaning to crucial words in the protocol such as "alert." For instance, an informal survey of French users of the MPDS suggested that "alerte," the French translation of "alert," is best described as having a more singular meaning of vigilant or "on high alert" rather than having multiple meanings that encompass vigilance as well as the relevant clinical sense. Expanded studies will also attempt to determine which of the proposed explanations best predicts the improvements seen with the new phrasing so that relevant linguistic approaches can be applied to the development or rephrasing of other protocol questions in the future.

Limitations

The data for this study were collected from a single agency in Brazil—although the largest. EMDs in Brazil may not be representative of EMDs everywhere in the world, and language differences may impact whether the findings of this study are generalizable to other agencies. For instance, the same study

conducted with an English version of the protocol might not yield the same results because of differences in meaning between the Portuguese "alerta" and its English translation, "alert."

Also, actual understanding may be different from perceived understanding.[12] Callers in this study appeared to understand the revised phrasing better than the original phrasing; however, this apparent understanding may not correlate with accurate assessment of patient status. Future studies will have to compare caller certainty and understanding against EMS or hospital outcomes to determine whether callers really do provide more accurate patient status reports in response to the new phrasing.

CONCLUSION

The study demonstrated that callers provided much more certain answers in response to the phrase, "Is s/he responding normally (completely alert)?" than to "Is s/he completely alert (responding appropriately)?" The findings suggested that callers understood the new phrasing better and were therefore more likely to provide accurate reports of patient status—and to do so on the first attempt. Further investigating the linguistic explanations proposed by this study may provide insights into the ways the specific wording of the protocol can improve EMD-caller interactions, patient condition evaluations, and, potentially, patient outcomes.

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